

REMARKS

Amendments

Claim 1 is amended to incorporate subject matter from claim 28, now cancelled. In amended claim 1, R⁷ and R⁸ are defined as each being hydrogen, alkyl, or aryl. Claims 18 and 20 are amended to depend from claim 17, rather depending directly from claim 1.

Rejection under 35 USC 112, second paragraph

Claims 18 and 20 are rejected under 35 USC 112, second paragraph, on grounds of indefiniteness. Claims 18 and 20 are amended to depend from claim 17, rather depending directly from claim 1. Claim 17 provides antecedent basis for the dosing device recited in claims 18 and 20. Withdrawal of the rejection is respectfully requested.

Rejection under 35 USC 103(a) in view of Hofmann, Keane et al. and Blatz

Claims 1, 7, 13, 15, 17-19, 21-23, 27-29, 33, and 39 are rejected under 35 USC 103(a) as being obvious in view of the disclosure of Hofmann (WO 02/12356), in combination with the disclosure of Keane et al. (US 5,886,075), as evidenced by Blatz (US 5,770,654). This rejection is respectfully traversed.

The disclosure of Hofmann is directed to converting scrap polyvinylbutyral (PVB) material, resulting from PVB manufacture and/or laminate production using PVB films. See page 1, lines 22-30. Hofmann's invention is directed to converting the PVB scrap material into pellets that can be used to prepare PVB/polymer blends. See page 2, lines 19-26.

Hofmann discloses a process for providing a non-blocking polyvinylbutyral (PVB) composition containing a chemically-modified PVB polymer. The chemically-modified PVB is the reaction product of unmodified PVB, having hydroxyl function, and a second component which reacts with the hydroxyl function of PVB, for example, a polymer with an anhydride function. Thus, as described at page 5, lines 1-5 of the Hofmann disclosure, the process comprises: heating the PVB and second component to obtain a melt blend, cooling the melt blend to obtain a solid composition, and pelletizing the solid composition. Hoffmann discloses at page 5, lines 11-13 that the melt blend can be obtained by heating the mixture to 100-260 °C. Hofmann further disclose that the modified PVB polymer can be

extruded in a single or twin screw extruder at temperatures of 75-250 °C, and that the pellets can be obtained from the extruded modified PVB polymer. See page 6, lines 5-9.

With regards to the second component, Hofmann discloses that this component preferably has an anhydride function. In the Examples, Hofmann uses Fusabond ® polymers (polyolefins with anhydride functionality), nylon, or Nucrel ® (4% methacrylic acid) as the second component. See the Samples used in the Examples

Hofmann does not disclose or suggest introducing at least one part of the PVB composition into the screw extruder via at least one side stream inlet. In addition, the chemically-modified PVB polymer of Hofmann is not a polyvinylacetal-containing composition that contains a polyvinylacetal obtained by reaction of at least a polymer (A) and at least a compound (B), in accordance with applicants' claim 1. Compare, for example, formula 4 of claim 1 and the polymers used by Hofmann as the second component.

The disclosure of Keane et al. is not related to the use of conversion of scrap PVB material into modified PVB. Moreover, the disclosure of Keane et al. is not directed to the formation of pellets of any polymer, let alone pellets of modified PVB for use in preparing PVB/polymer blends. Thus, one of ordinary skill in the art looking to modify the scrap conversion and pelletization process of Hofmann would not look to the disclosure of Keane et al.

As shown in Figures 1 and 2, in the process of Keane et al. polyvinylbutyral resin, plasticizer, adhesion control agent additive, and water are fed into a main extrusion compounder to form a blend. The resultant extruded blend discharged from the main extrusion compounder and is then sent to a sheet production process. The sheet product is tested for acidity and these test results are used to regulate the flow of water into the main extrusion compounder. The embodiment of Figure 2 further provides for the addition of PVB recycle to the main extrusion compounder. See column 2, lines 23-41. The recycled film or trim is sent to a satellite mechanical compounder, which can be a single screw extruder, and the satellite recycle system then injects recycle into the main extrusion compounder downstream of the main resin fresh feed inlet. See column 3, lines 4-39.

The disclosure of Keane et al., however, provides no reason to modify the disclosure of Hofmann. Firstly, as noted above, Keane et al. is directed to a sheet formation process and therefore provides no suggestion or reasons for modifying a pelletization process.

Furthermore, the existence of a recycle stream in the process of Keane et al. does not provide any reason to modify the process of Hofmann so as to have a side stream inlet. In the process of Keane et al., the purpose of the recycle stream is for a recycling PVB film or trim to be combined with fresh PVB resin. However, the entire process of Hofmann is directed to reusing or recycling PVB scrap. Thus, the main feed to the Hofmann extruder is recycled PVB. Therefore, the Hofmann and Keane et al. disclosures suggest no reason to provide a separate side stream inlet for recycled PVB in the Hofmann process.

In the rejection, it is argued that PVB recycle may already contain plasticizer and therefore “need not be mixed with additional plasticizer.” However, the Hofmann process uses PVB recycle as part of its main feed and therefore there is no suggestion to introduce PVB recycle separate from the main feed. Furthermore, Hofmann does not mention the use of plasticizers.

Additionally, Keane et al. provide no suggestion to modify the process of Hofmann so as to use a polyvinylacetal-containing composition that contains a polyvinylacetal obtained by reaction of at least a polymer (A) and at least a compound (B), in accordance with applicants’ claim 1.

The rejection also refers to the disclosure of Blatz (US 5,770,654) because this disclosure is mentioned by Hofmann. Specifically, Hofmann cites Blatz as evidence that PVB blends with other polymers is known. Hofmann states that Blatz discloses PVB/polyamide blends.

Blatz disclose a composition comprising a uniform blend of uniform blend of 50-90 weight percent of a polyamide; 50-10 weight percent of recovered plasticized polyvinylbutyral; and 0-10 weight percent of an elastomer. The blend has a polyamide matrix, and a dispersed phase of plasticized polyvinylbutyral. See column 1, line 46-column 2, line 6.

Blatz does not provide any suggestion to modify the Hofmann process so as to introduce at least one part of the PVB composition into the screw extruder via at least one side stream inlet. In addition, Blatz provides no suggestion of modifying the Hofmann process so as to use a polyvinylacetal-containing composition that contains a polyvinylacetal obtained by reaction of at least a polymer (A) and at least a compound (B), in accordance with applicants’ claim 1.

In view of the above remarks, it is respectfully submitted that the disclosure of Hofmann (WO 02/12356), taken alone or in combination with the disclosures of Keane et al. and/or Blatz, fails to render obvious applicants' claimed process under 35 USC 103(a). Withdrawal of the rejection is respectfully requested.

Rejection under 35 USC 103(a) in view of Hofmann, Keane et al., Schwind et al., and Blatz

Claims 4 and 38 are rejected under 35 USC 103(a) as being obvious in view of the disclosure of Hofmann (WO 02/12356), in combination with the disclosure of Keane et al. (US 5,886,075), and Schwind et al. (US 2002/0017735), as evidenced by Blatz (US 5,770,654).

The disclosures of Hofmann (WO 02/12356), Keane et al. (US 5,886,075), and Blatz (US 5,770,654) are discussed above. In the rejection it is acknowledged that Hofmann does not disclose performing granulation by hot or cold pelletization. In this regard, the rejection refers to the disclosure of Schwind et al. (US 2002/0017735).

However, the Schwind et al. process is not a process for forming granules or pellets. Instead, Schwind et al. disclose a method for manufacturing synthetic fibers from a melt mixture of fiber forming matrix polymers. At least one second amorphous additive polymer is added to the fiber forming polymer matrix, wherein the amorphous additive polymer is immiscible with the fiber forming matrix polymer. The additive polymer is said to be synthesized by multiple initiation. In any event, Schwind et al. expressly disclose that the inventive method "does not require granulation of the additive polymer elongation increasing agent." See paragraph [0021].

The rejection refers to paragraph [0131]. This paragraph states that the "elongation increasing agent to be used in the invention is not granulated, in contrast to the state of the art." The paragraph further describes known processes of cold pelletization and hot pelletization. However, since the disclosure of Schwind et al. seeks to avoid granulation/pelletization, one skilled in the art would not look to the Schwind et al. to modify a granulation/pelletization procedure.

Additionally, the Schwind et al. disclosure does not overcome the deficiencies

discussed above with regards to the combination of the Hofmann, Keane et al., and Blatz disclosures.

In view of the above remarks, it is respectfully submitted that the disclosure of Hofmann (WO 02/12356), taken alone or in combination with the disclosures of Keane et al., Blatz and/or Schwind et al., fails to render obvious applicants' claimed invention. Withdrawal of the rejection is respectfully requested.

Rejection under 35 USC 103(a) in view of Hofmann, Keane et al., Higuchi et al., and Blatz

Claim 5 is rejected under 35 USC 103(a) as being obvious in view of the disclosure of Hofmann (WO 02/12356), in combination with the disclosure of Keane et al. (US 5,886,075), and Higuchi et al. (JP 59-166549), as evidenced by Blatz (US 5,770,654).

The disclosures of Hofmann (WO 02/12356), Keane et al. (US 5,886,075), and Blatz (US 5,770,654) are discussed above. In the rejection it is acknowledged that Hofmann does not disclose the use of a foaming agent. In this regard, the rejection refers to the disclosure of Higuchi et al. Specifically, it is argued in the rejection that the abstract of Higuchi et al. discloses the use of a foaming agent in a polyvinyl acetal composition.

The Higuchi et al. disclosure does not overcome the deficiencies discussed above with regards to the combination of the Hofmann, Keane et al., and Blatz disclosures.

In view of the above remarks, it is respectfully submitted that the disclosure of Hofmann (WO 02/12356), taken alone or in combination with the disclosures of Keane et al., Blatz and/or Higuchi et al., fails to render obvious applicants' claimed invention. Withdrawal of the rejection is respectfully requested.

Rejection under 35 USC 103(a) in view of Hofmann, Keane et al., Kiyono et al., and Blatz

Claims 8-12 and 14 are rejected under 35 USC 103(a) as being obvious in view of the disclosure of Hofmann (WO 02/12356), in combination with the disclosure of Keane et al. (US 5,886,075), and Kiyono et al. (US 3,679,788), as evidenced by Blatz (US 5,770,654). This rejection is respectfully traversed.

The disclosures of Hofmann (WO 02/12356), Keane et al. (US 5,886,075), and Blatz

(US 5,770,654) are discussed above. In the rejection it is acknowledged that these disclosures do not disclose cooling the side stream inlet, or cooling the side stream inlet to a temperature which is less than or equal to the glass transition temperature of the polyvinylacetal-containing composition.

The rejection asserts that “the side stream inlet would typically be at ambient conditions.” No evidence or arguments are offered in support of this conclusory statement. Nor does an assertion of ambient temperature suggest an active step of cooling.

Further, it is argued that is known to cool below melt or flow temperatures to prevent unwanted melting, and that it would be obvious to ensure that the PVB pellets remain in solid form inside the extruder of Hofmann. It is not clear why it would be obvious to retain solid pellets within an extruder that is designed to create a molten blend. Additionally, the disclosure of Keane et al., which is relied on for its recycle disclosure, states that recycle system is designed to inject **molten** recycle into the main extrusion compounder. See column 3, lines 33-39.

Additionally, the rejection asserts that Kiyono et al. (US 3,679,788) disclose that cooling may be used to prevent unwanted melting in areas of an extruder. Specifically, the rejection refers to column 4, lines 39-51 of Kiyono et al. The Kiyono et al. process comprises feeding thermoplastic resin into a screw type extruder; rotating the screw to transfer the resin maintained in an unmolten state; injecting liquid matter into the extruder to mix with the unmelted resin; continuously rotating the screw to mix and disperse the liquid matter in the unmelted resin and to advance the mixture towards the extruder outlet; and further continuing to rotate the screw to melt the mixture, and knead and extrude the resultant molten mixture.

At column 4, lines 39-51, Kiyono et al. disclose that it is “ necessary” to prevent the thermoplastic resin from melting during the mixing with the liquid matter in the extruder, i.e., it needs to be maintained in unmolten state. To prevent melting during this mixing step, Kiyono et al. forcibly cool “certain portions of cylinder and screws at which the resin should be maintained un-molten, with suitable coolant such as water.”

The process of Hofmann (WO 02/12356) does not involve injecting liquid matter into the extruder to mix with the unmelted resin. Thus, the disclosure of Kiyono et al. provides no suggestion of modifying the Hofmann process to use a side stream inlet to introduce at least part of the PVB composition into a screw extruder, and to further cool such a side stream

inlet. Similarly, Kiyono et al. do not suggest cooling such a side stream inlet to a temperature less than or equal to the glass transition temperature of the PVB composition of Hofmann.

Additionally, the Kiyono et al. disclosure does not overcome the deficiencies discussed above with regards to the combination of the Hofmann, Keane et al., and Blatz disclosures.

In view of the above remarks, it is respectfully submitted that the disclosure of Hofmann (WO 02/12356), taken alone or in combination with the disclosures of Keane et al., Blatz and/or Kiyono et al., fails to render obvious applicants' claimed invention. Withdrawal of the rejection is respectfully requested.

Rejection under 35 USC 103(a) in view of Hofmann, Keane et al., Ealer, and Blatz

Claims 16 and 46 are rejected under 35 USC 103(a) as being obvious in view of the disclosure of Hofmann (WO 02/12356), in combination with the disclosure of Keane et al. (US 5,886,075), and Ealer (US 4,594,213), as evidenced by Blatz (US 5,770,654). This rejection is respectfully traversed.

The disclosures of Hofmann (WO 02/12356), Keane et al. (US 5,886,075), and Blatz (US 5,770,654) are discussed above. In the rejection it is acknowledged that these disclosures do not disclose removal of gaseous compounds via the main entry port of the extruder. But, it is argued in the rejection that Ealer discloses "that when extruding PVB, it is important to remove volatiles from the extruder to eliminate bubble formation," citing column 4, lines 7-24. See page 13 of the Office Action.

However, Ealer does not mention PVB or the extrusion of PVB. The Ealer process is directed to the extrusion of polyethylene, not PVB. Furthermore, the process of Ealer is directed to the reduction of "lensing in films formed from granular polyolefins such as polyethylene." See column 1, lines 7-9. Further, in the disclosure cited in the rejection, Ealer describes that bubble formation can lead to film lensing.

Thus, the process of Ealer is directed to film formation, particularly polyolefin film formation, and provides no suggestion of modifying a process for forming pellets of modified PVB. Moreover, Ealer does not suggest that bubble formation would be a problem in a process for forming pellets of modified PVB.

Additionally, the Ealer disclosure does not overcome the deficiencies discussed above

with regards to the combination of the Hofmann, Keane et al., and Blatz disclosures.

In view of the above remarks, it is respectfully submitted that the disclosure of Hofmann (WO 02/12356), taken alone or in combination with the disclosures of Keane et al., Blatz and/or Ealer, fails to render obvious applicants' claimed invention. Withdrawal of the rejection is respectfully requested.

Rejection under 35 USC 103(a) in view of Hofmann, Keane et al., Nachtergaele et al., and Blatz

Claims 17-20 are rejected under 35 USC 103(a) as allegedly being obvious in view of Hofmann (WO 02/12356), in combination with the disclosure of Keane et al. (US 5,886,075), and Nachtergaele et al. (US 5,032,337), as evidenced by Blatz (US 5,770,654). This rejection is respectfully traversed.

The disclosures of Hofmann (WO 02/12356), Keane et al. (US 5,886,075), and Blatz (US 5,770,654) are discussed above. Nachtergaele et al. disclose a process for making a mixture of starch and polyvinyl alcohol wherein the resultant mixture is soluble in cold water. In the process, 50 to 95 parts by weight starch and 5 to 50 parts by weight polyvinyl alcohol are thoroughly mixed, the moisture content is regulated between 10-25 wt %, and the mixture is subjected to a thermo-mechanical treatment at a temperature situated between 110° and 180° C during which the mixture is subjected to shearing forces. The thermo-mechanical treatment can be an extrusion.

The rejection refers to the disclosure at column 3, lines 24-34. In this portion of the disclosure, Nachtergaele et al. describe a "suitable" extrusion apparatus for his process which has an extruder with a capacity of 18 kg of product per hour, a length diameter ratio of 7, a dosing screw which rotates at 13 revolutions per minute, and an extrusion screw which rotates at 97 revolutions per minute.

The Nachtergaele et al. disclosure does not overcome the deficiencies discussed above with regards to the combination of the Hofmann, Keane et al., and Blatz disclosures.

In view of the above remarks, it is respectfully submitted that the disclosure of Hofmann (WO 02/12356), taken alone or in combination with the disclosures of Keane et al., Blatz and/or Nachtergaele et al., fails to render obvious applicants' claimed invention. Withdrawal of the rejection is respectfully requested.

Rejection under 35 USC 103(a) in view of Hofmann, Keane et al., Lerman et al., and Blatz

Claims 25, 26, and 40-45 are rejected under 35 USC 103(a) as allegedly being obvious in view of Hofmann (WO 02/12356), in combination with the disclosure of Keane et al. (US 5,886,075), and Lerman et al. (US 3,472,801), as evidenced by Blatz (US 5,770,654). This rejection is respectfully traversed.

The disclosures of Hofmann (WO 02/12356), Keane et al. (US 5,886,075), and Blatz (US 5,770,654) are discussed above. In the rejection it is acknowledged that these references do not disclose bulk densities and particle size distributions. In this regard, the rejection refers to the disclosure of Lerman et al. (US 3,472,801).

Lerman et al. disclose a process for forming foamed spherical particles of thermoplastic polymer. Lerman et al. disclose that the polymer can be selected from a broad generic class of materials. See column 3, line 72 – column 4, line 15. All of the Examples disclosed by Lerman et al. employ polyethylene and ethylene-acetate, not a polyvinylacetal such as PVB. In the process of Lerman et al. a granular, powdered, or extruded polymer containing a blowing agent is melted and dispersed in a liquid. This dispersion is then further heated to expand or foam the melted particle with spherizing and possible coalescence. Then, while still in a dispersed state, the particles are cooled, collected, and separated from dispersion medium. See column 2, lines 24-65, and the Examples.

In the rejection, it is argued that Lerman disclose that operating conditions will vary based on the desired particle size and density. Lerman discloses that the particles obtained by the process are generally in the form of a powder with a narrow size distribution within the range of 10-2000 microns. Further, Lerman discloses that control of size and density can yield particles suitable for airborne and water dissemination studies, coatings, and educational/entertaining toys. These disclosures provide no rationale for modifying a process directed to the formation of modified PVB pellets for use in forming PVB/polymer blends as disclosed by Hofmann.

Additionally, the Lerman disclosure does not overcome the deficiencies discussed above with regards to the combination of the Hofmann, Keane et al., and Blatz disclosures.

In view of the above remarks, it is respectfully submitted that the disclosure of

Hofmann (WO 02/12356), taken alone or in combination with the disclosures of Keane et al., Blatz and/or Lerman, fails to render obvious applicants' claimed invention. Withdrawal of the rejection is respectfully requested.

Rejection under 35 USC 103(a) in view of Hofmann, Keane et al., Kroggel et al., and Blatz

Claims 30 and 31 are rejected under 35 USC 103(a) as allegedly being obvious in view of Hofmann (WO 02/12356), in combination with the disclosure of Keane et al. (US 5,886,075), and Kroggel et al. (US 5,559,175), as evidenced by Blatz (US 5,770,654). This rejection is respectfully traversed.

The disclosures of Hofmann (WO 02/12356), Keane et al. (US 5,886,075), and Blatz (US 5,770,654) are discussed above. In the rejection it is acknowledged that these references do not disclose polyvinylacetal particles containing fibers. However, the rejection asserts that Kroggel et al. disclose adding fibers to polyvinyl dispersions, citing column 8, lines 44-65. This is incorrect.

At column 8, lines 44-65, Kroggel et al. describe uses of their aqueous polyvinyl acetal dispersions and dry polyvinyl acetal powders obtained therefrom. The uses include "for gluing various materials such as metals, ceramic materials, plastics, fibers, films, textiles, paper and wood." Thus, the reference to fibers concerns gluing fibers together, not to a granulate prepared by extrusion and pelletization that contains fibers.

Additionally, the Kroggel et al. disclosure does not overcome the deficiencies discussed above with regards to the combination of the Hofmann, Keane et al., and Blatz disclosures.

In view of the above remarks, it is respectfully submitted that the disclosure of Hofmann (WO 02/12356), taken alone or in combination with the disclosures of Keane et al., Blatz and/or Kroggel et al., fails to render obvious applicants' claimed invention. Withdrawal of the rejection is respectfully requested.

The Commissioner is hereby authorized to charge any fees associated with this response or credit any overpayment to Deposit Account No. 13-3402.

Respectfully submitted,

/Brion P. Heaney/

Brion P. Heaney, Reg. No. 32,542
Attorney for Applicants

MILLEN, WHITE, ZELANO & BRANIGAN, P.C.
Arlington Courthouse Plaza 1
2200 Clarendon Boulevard, Suite 1400
Arlington, VA 22201
Telephone: 703-243-6333
Facsimile: 703-243-6410
Attorney Docket No.: KURARAY-0012

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